

month, and the growth of crops very good. Owing, however, to the lack of rain, the soil became hard and refractory, delaying fall plowing and other preparation for late seeding, and retarding germination of recently seeded fields of wheat and oats.—*Edward A. Evans.*

*Washington.*—The mean temperature was 54.8°, or 5.3° above normal; the highest was 87°, at Pasco on the 20th, and the lowest, 21°, at Northport on the 13th. The average precipitation was 2.12, or 0.68 below normal; the greatest monthly amount, 10.71, occurred at Clearwater, while none fell at Pasco.

The phenomenally warm and pleasant weather was very favorable for plowing, thrashing, and gathering fall crops. The yield of oats was large, and the wheat yield heavy beyond expectations. The potato and apple crops were short. September sown wheat made good growth, but October sown did not germinate well until the close of the month. Pastures were greatly improved by the rain that fell during the last week, and the condition of the soil was greatly improved.—*G. N. Salisbury.*

*West Virginia.*—The mean temperature was 54.3°, or 0.7° below normal; the highest was 86°, at Powellton on the 1st, and the lowest, 19°, at Philippi on the 25th. The average precipitation was 0.54, or 1.68 below normal; the greatest monthly amount, 1.60, occurred at Princeton, and the least, 0.12, at Dayton.

The clear, dry weather, with cool nights and warm days, was favorable for farm work of all kinds, which was well up to date at the close of the month. Corn cutting progressed well and some corn was husked, although it was rather too dry for this work. Apples had all been gathered with below average yield, except in the panhandle section,

where an average crop of good quality was raised. Pastures were short and dried up, but stock was doing fairly well. Water in streams, and in wells in some cases, was getting scarce. Plowing for wheat was mostly completed, and wheat was about all sown, but was not germinating very well on account of lack of moisture.—*E. C. Voss.*

*Wisconsin.*—The mean temperature was 50.7°, or 2.5° above normal; the highest was 86°, at Racine on the 1st, and the lowest, 12°, at North Crandon on the 28th. The average precipitation was 2.60, or 0.24 above normal; the greatest monthly amount, 5.49 occurred at Menasha, and the least, 0.65, at Milwaukee.

The month was mild and equable throughout, and favorable for the completion of fall work. Plowing, husking, and potato digging were generally completed by the end of the month. The rains during the second week were very beneficial to fall grains and pastures. Winter wheat and rye made good growth and are now generally in good condition.—*W. M. Wilson.*

*Wyoming.*—The mean temperature was 47.6°, or 2.9° above normal; the highest was 86°, at Bitter Creek on the 5th, and the lowest, 10°, at Daniel on the 31st. The average precipitation was 0.76, or 0.04 below normal; the greatest monthly amount, 1.82, occurred at Evanston, and the least, 0.05, at Hyattville.

The month was unusually favorable for stock, and special reports from correspondents indicate that in nearly every section the outlook for the winter is exceptionally bright. The range feed is better than the average, stock now in first-class condition, and the supply of hay on hand is probably greater than ever before in the history of the State.—*W. S. Palmer.*

## SPECIAL CONTRIBUTIONS.

### CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTRER, Director, Physical Geographic Institute.

TABLE 1.—Hourly observations at the Observatory, San Jose de Costa Rica, during October, 1901.

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Duration, 1901.
	660+ Mm.	660+ Mm.	° C.	° C.	%	%	Mm.	Mm.	Hrs.
1 a. m.	3.47	3.14	17.19	17.81	94	95	2.0	4.2	2.17
2 a. m.	3.22	3.74	16.96	17.18	94	95	0.7	3.7	2.00
3 a. m.	3.06	3.56	16.73	16.93	95	95	0.5	3.2	1.17
4 a. m.	3.03	2.59	16.60	16.82	94	95	0.4	2.3	2.59
5 a. m.	3.12	2.86	16.33	16.65	95	95	0.3	1.8	1.50
6 a. m.	3.46	3.29	16.50	16.61	94	94	0.1	1.6	0.50
7 a. m.	3.81	3.86	17.84	17.81	89	90	0.0	2.0	0.00
8 a. m.	4.07	3.89	19.55	19.52	82	83	1.9	1.8	1.00
9 a. m.	4.85	4.16	22.02	21.73	72	78	0.2	0.8	0.67
10 a. m.	4.36	4.14	23.85	23.54	67	71	0.0	0.5	0.00
11 a. m.	3.97	3.72	24.61	24.48	66	70	0.1	0.8	0.33
12 m.	3.54	3.16	24.67	24.53	67	71	0.9	2.8	1.00
1 p. m.	2.71	2.53	24.16	24.13	70	72	6.8	6.9	1.50
2 p. m.	2.30	2.11	22.94	22.26	74	76	36.4	18.9	4.11
3 p. m.	2.12	1.82	21.73	21.95	80	81	89.9	35.9	8.67
4 p. m.	2.26	2.03	20.75	20.70	81	86	66.4	42.1	10.08
5 p. m.	2.58	2.38	19.65	19.80	87	88	99.5	50.5	10.76
6 p. m.	3.01	2.76	19.80	19.10	92	92	79.5	49.5	14.24
7 p. m.	3.47	3.34	18.68	18.67	98	98	38.7	47.0	12.99
8 p. m.	3.79	3.73	18.44	18.43	98	98	16.9	24.3	10.66
9 p. m.	4.15	3.92	18.27	18.22	98	94	12.7	15.4	6.84
10 p. m.	4.21	4.06	18.00	17.98	98	94	11.9	12.0	6.42
11 p. m.	4.16	3.91	17.79	17.59	98	94	6.8	8.8	5.00
Midnight	3.85	3.57	17.41	17.54	94	95	5.3	5.9	4.83
Mean	663.42	663.17	19.56	19.61	86	91			
Minimum	660.60	659.63	14.5	13.4	55				
Maximum	665.90	666.12	23.7	23.3	100		21.6		
Total							478.0	347.2	108.53

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. In the Costa Rican system the San Jose local time is used, which is 0° 36' 13" slower than seventy-fifth meridian time.

TABLE 2.

Time.	Sunshine.		Temperature of the soil at depth of—					Cloudiness observed, 1901.
	Observed, 1901.	Normal, 1889-1900.	0.15 m.	0.30 m.	0.60 m.	1.20 m.	3.00 m.	
	Hours.	Hours.	° C.	° C.	° C.	° C.	° C.	%
7 a. m.	7.65	6.01	21.46	21.43	22.06	21.90	21.57	68
8 a. m.	15.59	17.68						
9 a. m.	20.92	20.99						
10 a. m.	20.33	20.90	21.47	21.48	22.10	21.93		70
11 a. m.	17.15	18.58						
12 m.	14.59	14.09						
1 p. m.	7.14	11.39	21.88	21.66	22.12	21.91		84
2 p. m.	8.66	10.87						
3 p. m.	5.49	8.35						
4 p. m.	3.76	4.73	21.66	21.68	22.04	21.87		94
5 p. m.	1.58	1.55						
6 p. m.	0.17	0.22						
7 p. m.			21.75	21.67	22.05	21.86		88
8 p. m.								
9 p. m.								
10 p. m.			21.62	21.64	22.04	21.86		78
11 p. m.								
Midnight								
Mean			21.63	21.63	22.05	21.87	21.57	77
Total	123.02	135.65						

Notes on the weather.—Rains have been rather excessive on the Pacific slope and in the mountains of the central range. On the Atlantic coast belt the remarkable drought which has prevailed through several months seems to have come to an end. At San Jose there was a short period of summer (*verano*) from the 8th to the 14th, with only occasional showers and fresh northeasterly breezes.

Earthquakes at San Jose.—October 1, 11<sup>h</sup> 20<sup>m</sup> 42<sup>s</sup> a. m., slight shock, NNW-SSE, intensity II, duration 6 seconds; 8<sup>h</sup> 50<sup>m</sup> p. m., slight shock, NNW-SSE, intensity II, duration 12 seconds. October 2, 2<sup>h</sup> 49<sup>m</sup> 11<sup>s</sup> a. m., very light tremors, apparently NNW-SSE, intensity I, duration 6 seconds. October 3, 6<sup>h</sup> 28<sup>m</sup> 40<sup>s</sup> a. m., light shock, W-E, intensity I, duration inappreciable. October 7, 8<sup>h</sup> 12<sup>m</sup> 0<sup>s</sup> p. m., light shock, NNW-SSE, intensity I, duration 4 seconds; 8<sup>h</sup> 26<sup>m</sup> 33<sup>s</sup> p. m., strong and prolonged shock, NNW-SSE, intensity III, duration 21 seconds; 8<sup>h</sup> 27<sup>m</sup> 30<sup>s</sup> p. m., strong shock, NNW-SSE, intensity IV, duration 12 seconds; 8<sup>h</sup> 33<sup>m</sup> 27<sup>s</sup> p. m., slight shock, NNW-SSE, intensity II, duration 6 seconds. October 14, 10<sup>h</sup> 30<sup>m</sup> a. m., slight shock, NNE-SSW, intensity II, dura-

tion 5 seconds; 9<sup>h</sup> 30<sup>m</sup> p. m., light shock, NNW-SSE, intensity II, duration 5 seconds. October 25, 11<sup>h</sup> 25<sup>m</sup> p. m., slight but prolonged tremors, NNW-SSE, intensity II, duration 32 seconds. October 31, 6<sup>h</sup> 30<sup>m</sup> p. m., very slight tremors.

TABLE 3.—Rainfall at stations in Costa Rica, October, 1901.

Stations.	Amount.	No. rainy days.	Stations.	Amount.	No. rainy days.
	Mm.			Mm.	
1. Sipurlo (Talamancas).....	271	18	14. Juan Vinas.....	359	19
2. Boca Banano.....	163	16	15. Santiago.....	256	25
3. Limon.....	207	16	16. Paraiso.....	326	30
4. Swamp Mouth.....	146	16	17. Las Conchavos.....	368	18
5. Zent.....	194	8	18. Cartago.....	316	22
6. Gute Hoffnung.....	404	16	19. Tres Rios.....	316	22
7. Siquirres.....	489	21	20. S. Francisco G.....	464	23
8. Guapiles.....	801	30	21. San Jose.....	478	23
9. Sarapiquí.....	581	28	22. La Verbena.....	730	25
10. San Carlos.....	449	24	23. Nuestro Amo.....	325	25
11. Las Lomas.....	498	27	24. Alajuela.....	351	23
12. Peralta.....			25. San Isidro Alajuela.....	698	26
13. Turrialba.....					

## HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

Meteorological observations at Honolulu, October, 1901.

The station is at 21° 18' N., 157° 50' W.  
Hawaiian standard time is 10<sup>h</sup> 30<sup>m</sup> slow of Greenwich time. Honolulu local mean time is 10<sup>h</sup> 31<sup>m</sup> slow of Greenwich.  
Pressure is corrected for temperature and reduced to sea level, and the gravity correction, -0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m. Greenwich time, on the respective dates.

The rain gauge, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 48 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 a. m., Honolulu time.								Total rainfall at 9 a. m., local time.	
		Dry bulb.	Wet bulb.	Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
				Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.		Minimum.
1.....	29.85	73.4	71.4	83	67	68.4	77.4	sw-w.	3	1	29.92	29.84	0.18
2.....	29.89	73.3	72.3	80	71	71.7	88	s-ne.	1-0	10	29.91	29.83	0.14
3.....	29.96	72.7	69.3	77	73	72.5	91	e.	1-0	10	29.99	29.89	0.00
4.....	30.00	74.4	68.5	70	70	67.5	78	e-ne.	1	4-1	30.04	29.94	0.00
5.....	29.95	70.7	66.5	72	71	64.7	66	e-ne.	1	1-5	30.03	29.94	0.00
6.....	29.93	72.2	68.5	70	70	66.0	72	e-ne.	2	3	29.99	29.91	0.01
7.....	29.96	72.2	69.3	71	71	66.0	68	e-ne.	2	4	29.99	29.90	0.14
8.....	30.00	76.7	67.5	71	71	66.5	70	nne.	2-3	5	30.06	29.95	0.01
9.....	29.96	75.7	70	73	75	66.3	70	nne.	3	4	30.05	29.96	0.08
10.....	29.96	75.7	70	72	72	67.3	70	e.	3-4	5	29.99	29.87	0.02
11.....	29.96	68.8	66	71	67	67.0	74	e-s	1-0	4-10	29.91	29.81	0.00
12.....	29.91	71.1	68	68	68	67.3	81	n-s.	1	6-10	29.96	29.86	0.01
13.....	29.89	75.7	68	70	70	67.7	74	nne.	1-4	6	29.96	29.89	0.08
14.....	29.89	74.4	68	69	71	65.5	68	e.	3	3	29.93	29.85	0.01
15.....	29.90	72.2	69	68	73	66.0	69	nne.	3	3	29.94	29.85	0.00
16.....	29.93	70.7	68.5	69	69	67.5	74	e-ne.	3	5-1	29.97	29.90	0.04
17.....	29.95	74.4	69	68	69	66.5	75	nne.	3	4	30.00	29.92	0.02
18.....	29.95	71.1	68.3	68	72	66.3	69	nne.	3	3	30.00	29.92	0.01
19.....	29.96	69	67	68	68	67.7	76	e.	3	3	30.00	29.92	0.04
20.....	29.99	69	66	68	68	67.7	75	e.	3	3	30.04	29.96	0.02
21.....	29.98	66	64.7	63	63	66.5	72	e.	3-2	2	30.03	29.95	0.00
22.....	29.93	70	68	68	68	66.7	77	nne.	4-0	1	30.02	29.91	0.00
23.....	29.92	73	70.5	61	68	69.7	84	e.	2-0	7-1	29.98	29.90	0.07
24.....	29.92	70	69.3	61	69	69.0	78	nne.	1-5	7-1	29.99	29.89	0.09
25.....	29.94	70	68.7	61	69	69	84	e.	2	6	29.99	29.90	0.03
26.....	29.95	72	69	68	68	68.5	82	e.	2-4	8-6	29.99	29.93	0.28
27.....	29.94	76	70.5	60	70	68.3	75	e.	3	4	29.99	29.91	0.12
28.....	30.00	76	71.5	62	72	69.0	73	e.	4-5	4	30.03	29.94	0.01
29.....	29.99	76	70	62	74	68.7	73	e-ne.	3-1	4	30.04	29.95	0.00
30.....	29.98	74	70.5	62	75	68.7	74	e.	3-4	3	30.05	29.95	0.00
31.....	30.00	71	69.7	63	70	71.0	83	e-ne.	2	4	30.03	29.94	0.00
Sums.....													4.14
Means.....	29.941	72.2	68.7	81.9	70.5	67.8	76.0	2.3	4.7	29.994	29.906		
Departure..	-0.016					+1.7	+8.5		+4				+1.68

\*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4:31 p. m., Greenwich time. ‡These values are the means of (6+9+2+9) ÷ 4. §Beaufort scale.

Mean temperature for October, 1901 (6+2+9) ÷ 3 = 75.8°; normal is 76.3°. Mean pressure for October (9+3) ÷ 2 = 29.950; normal is 29.966.

## MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletín Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means are now reduced to standard gravity.

Mexican data for October, 1901.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inch.	° F.	° F.	° F.	%	Inch.		
Chihuahua.....	4,660	25.28	84.2	55.4	65.8	65	2.29	e.	
Guadalajara.....	5,186	24.94	78.3	55.4	68.4	70	4.60	nw.	
(Obs. del Est.)									
Guanajuato.....	6,640	23.69	83.3	43.7	64.4	53	0.28	ene.	
Leon (Guanajuato).....	5,906	24.29	78.3	41.4	63.3	71	0.94	ne.	
Linares.....	1,188	28.44	88.7	53.6	73.9	76	3.89	s.	
Mazatlan.....	25	29.84	89.4	72.9	81.7	78	2.12	nw.	
Merida.....	50	29.87	95.0	62.1	78.3	81	1.26	ne.	
Mexico (Obs. Cent.).....	7,472	23.05	74.5	42.8	58.8	66	1.14	n.	
Monterrey (Sem.).....	1,626	28.34	101.1	48.2	71.4	74	3.23	ene.	
Morelia (Seminario).....	6,401	23.87	75.9	47.5	61.7	73	1.59	ne.	
Puebla (Col. Cat.).....	7,125	23.37	76.6	47.1	62.4	66	0.86	ene.	
Puebla (Col. d. Est.).....	7,118	23.34	77.0	43.0	62.1	65	0.96	ene.	
Queretaro.....	6,070	24.20	78.3	47.3	62.8	61	0.15	e.	
S. Isidro (Hac. de Gto).....			73.8	61.7			1.38		
Toluca.....	8,812	21.95	70.9	34.9	54.9	68	1.13	w.	
Zapotlan.....	5,078	25.06	80.6	53.2	67.8	68	4.24	n.	

\*Reduced to standard temperature and gravity.

## RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Scientific American. New York. Vol. 85.

— Santos Dumont wins the Deutsch Prize. P. 312.

Hopkins, George M. A few Meteorological Instruments. P. 312.

Scientific American Supplement. New York. Vol. 52.

— The Rose "Aviator." P. 21622.

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Abbe, Cleveland. Cannonade against hailstorms. Pp. 738-739.

Terrestrial Magnetism. Baltimore. Vol. 6.

Ebert, H. Verteilung der elektrischen Ionen in den höheren Schichten der Atmosphäre. Pp. 97-119.

Kesslitz, Wilhelm. Report on the Magnetic Observations made at Pola, Austria, during the time of the Total Solar Eclipse of May 17, 18, 1901. Pp. 123-125.

Moureaux, Th. Report on the Magnetic Observations made at the Magnetic Observatory at Val-Joyeux, France, during the Total Solar Eclipse of May 17, 18, 1901. Pp. 125-128.

Haga, W. Report on the Magnetic Observations made at the University of Groningen, Holland, during the Total Solar Eclipse of May 17, 18, 1901. P. 129.

Snellen, Maurits. Report on the Magnetic Observations made at the de Bilt Meteorological and Magnetic Observatory near Utrecht, Holland, during the Total Solar Eclipse of May 17, 18, 1901. Pp. 129-134.

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Philosophical Magazine. London. 6th Series. Vol. 2.

Jeans, J. H. The Mechanism of Radiation. Pp. 421-456.

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Dickson, H. N. The Mean Temperature of the Atmosphere and the Causes of Glacial Periods. Pp. 516-523.